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## (54) Cutting apparatus

(57) Longitudinal and transverse cutting apparatus is positionable downstream of a packaging machine or a moulding machine to divide a strip-shaped multiple useful product into individual parts. To simplify the re-equipping of longitudinal cutting knives (27) of the apparatus when

these knives are to be added to or removed a slotted bore is provided in each knife holder (26) and a transverse shaft (25) mounting the knives is inwardly stepped at at least one end, the diameter of the stepped portion of the shaft being less than the width A of each slot so that the stepped portion can move through the slot to enable removal of the knife holder.

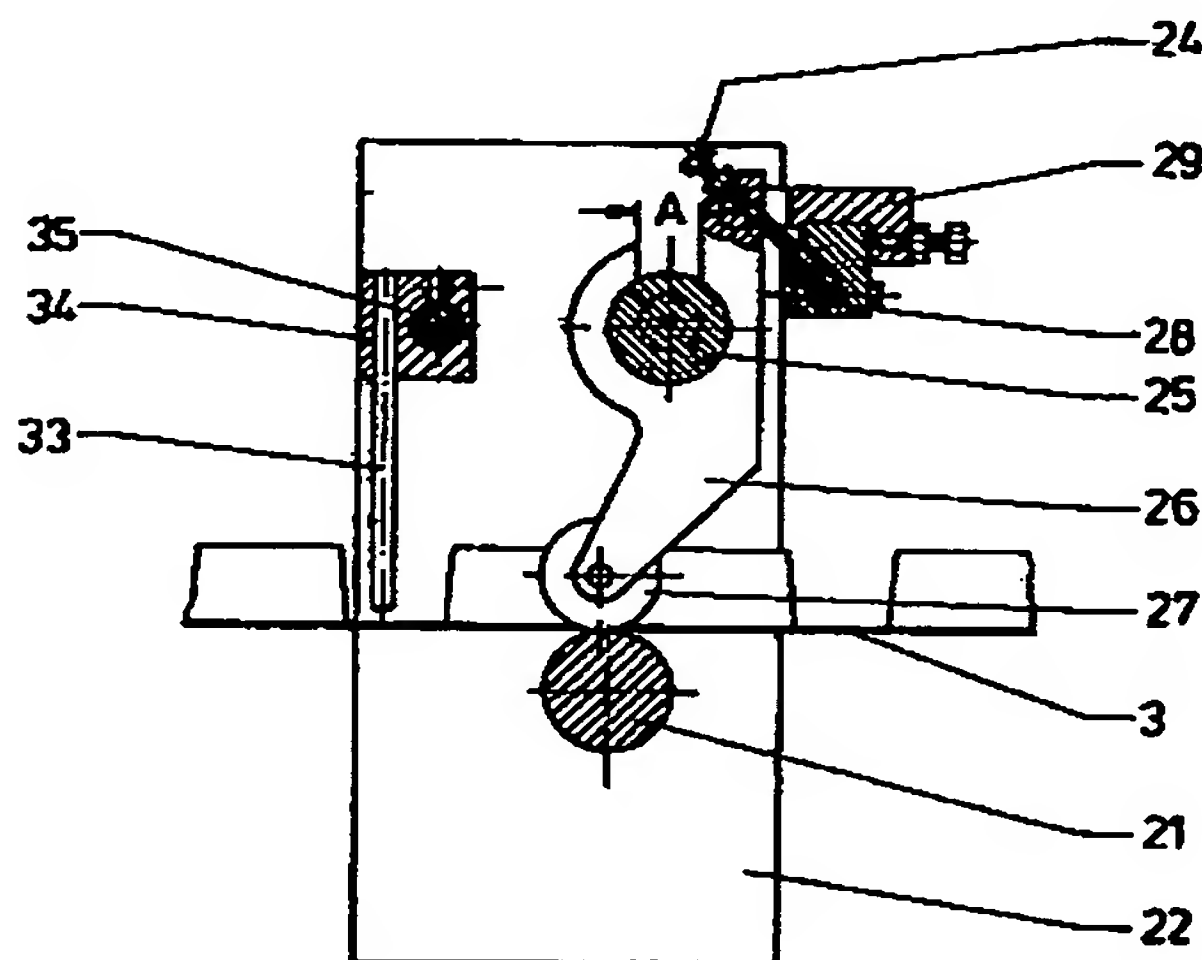


Fig. 2

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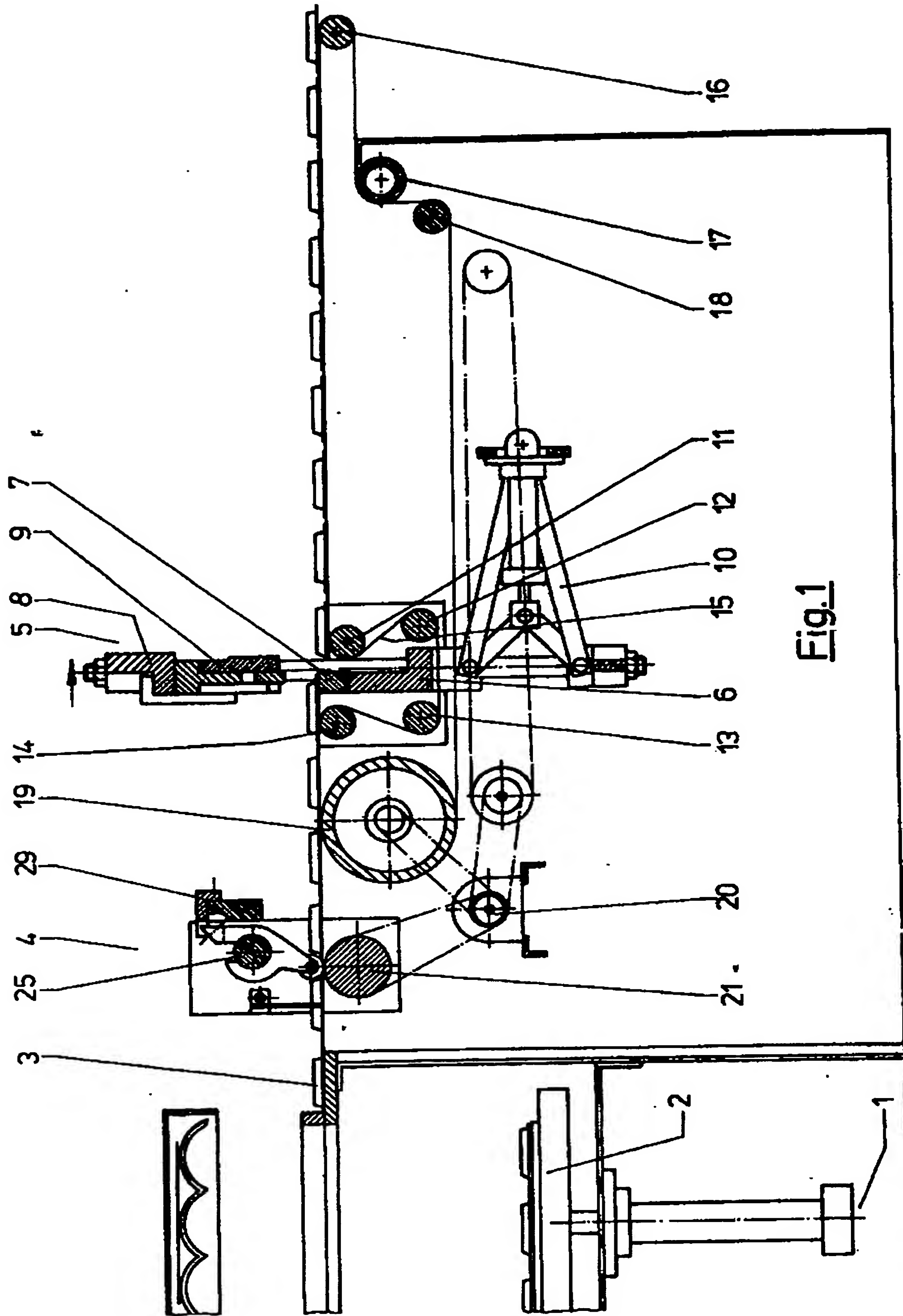
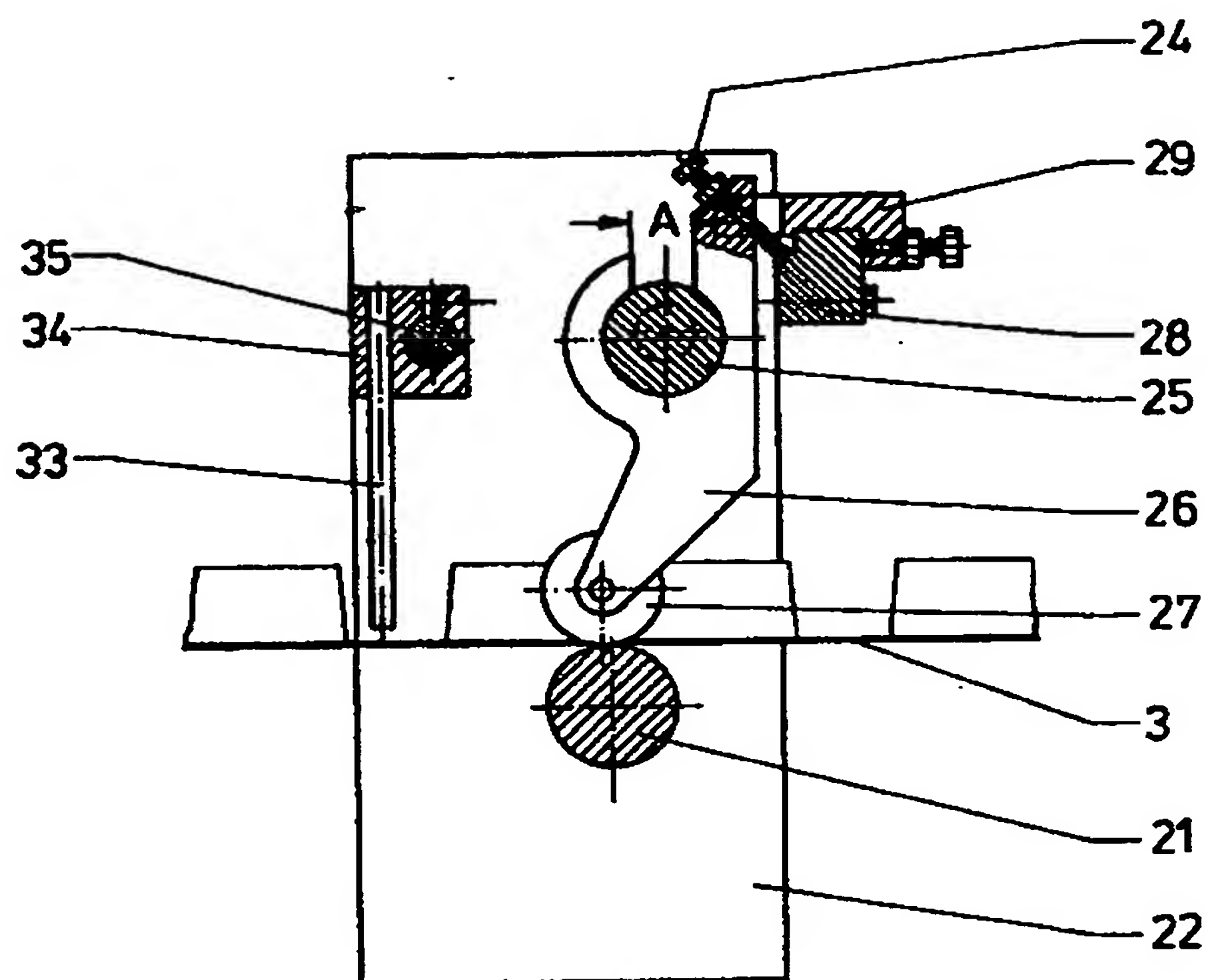
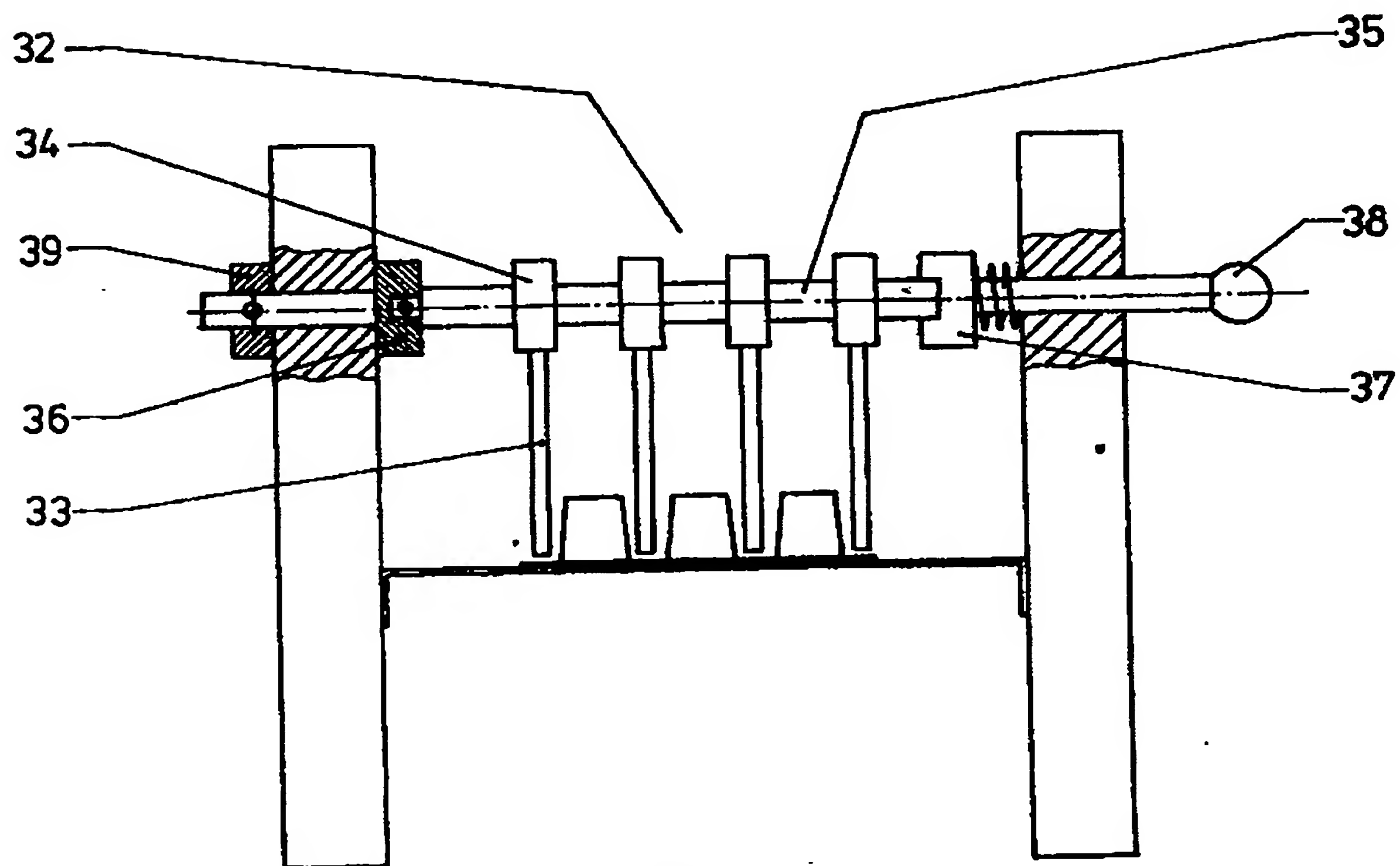
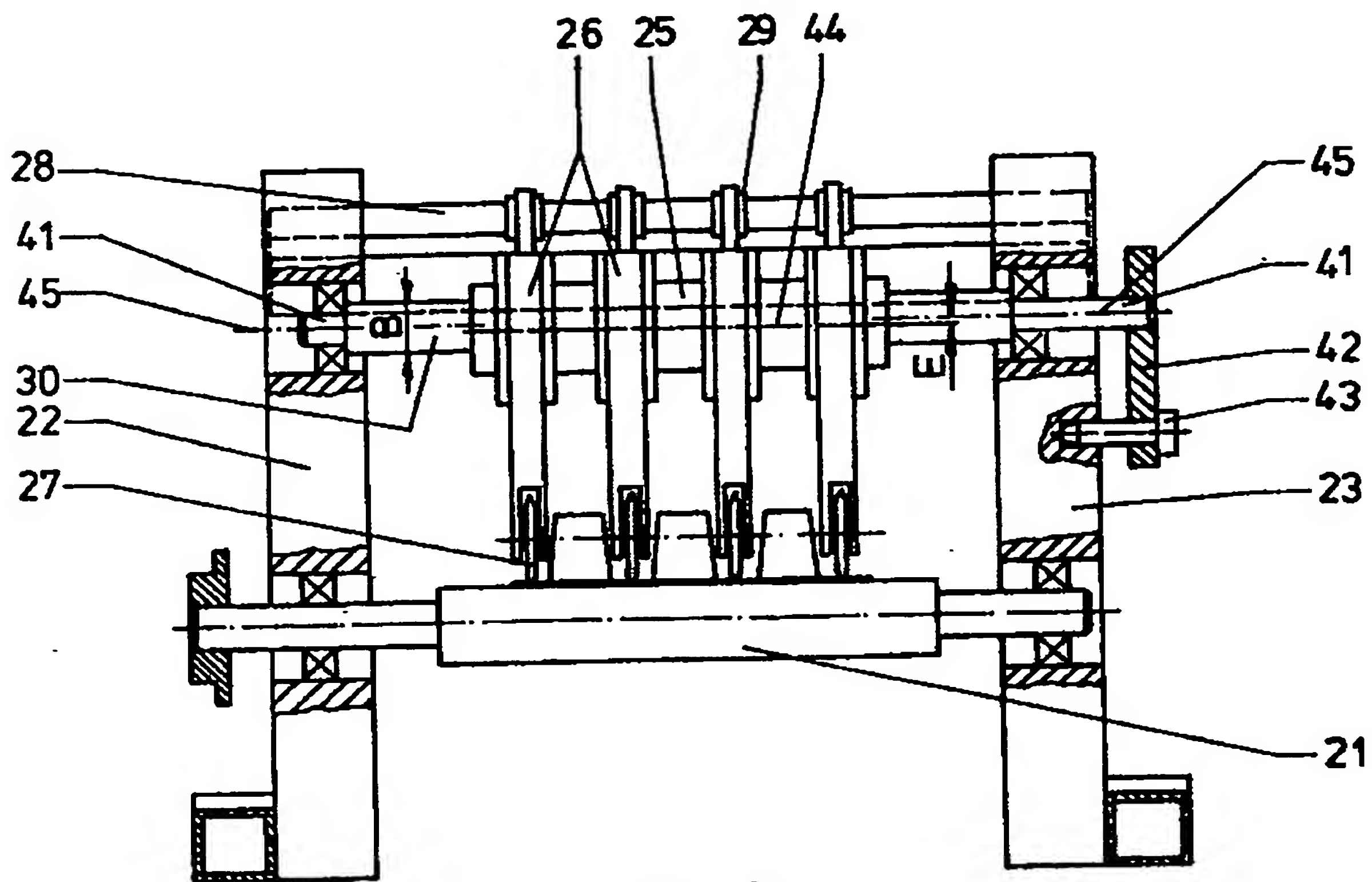


Fig. 1

Fig. 2



## SPECIFICATION

### Cutting apparatus

The present invention relates to cutting apparatus, and has particular reference to  
 5 apparatus with longitudinal and transverse cutting devices for selectable connection to and downstream of an intermittently operating skin packaging machine, to which are fed a film web from the roll and individual cardboard sections  
 10 with products lying thereon or a thermal moulding machine, which deforms a film web section by section, for the division of multiple products into individual products.

Cutting apparatus for this purpose is known from, for example DE-AS 23 51 069. All longitudinal cutting knives sit on a knife shaft in the known apparatus. They can be displaced transversely to the direction of advance for adaptation to different cutting widths.

20 When the number of the longitudinal cutting knives is to be varied or when damaged knives must be exchanged, then the removal of at least the knife shaft is necessary in order to be able to remove, exchange or add the individual knife  
 25 holders with knife discs. This is relatively complicated and requires a certain time, which incurs costs each time re-equipment or repair is carried out.

It is also known to arrange in front of each  
 30 longitudinal cutting knife a respective rod as a checking element, the rod being fastened through a clamping piece to a shaft. The pivotation of one of the rods effects rotary movement of the shaft, whereby a limit sensor can be actuated and the  
 35 drive for a belt advance is switched off. This equipment is particularly advantageous in the dividing-up of a strip with integrally packaged articles. The shaft of the checking equipment is rigidly arranged in bearings and must be taken out  
 40 when re-equipping to enable addition or removal of individual rods. An adaptation to the position of the longitudinal cutting knives is required on each resetting of the equipment. This, too, is awkward and is time-consuming.

45 There is accordingly a need for simplification of the re-equipping of such longitudinal cutting equipment and, optionally also, of such checking equipment, so that this can be carried out in a relatively quick and convenient manner.

50 According to the present invention there is provided cutting apparatus for longitudinal and transverse cutting of a strip to separate articles joined by the strip material, the apparatus comprising a transverse cutting device and a  
 55 longitudinal cutting device arranged upstream of the transverse cutting device with respect to a direction of movement of the strip through the apparatus, the longitudinal cutting device comprising a plurality of knives arranged to  
 60 produce cuts extending in said direction, a plurality of holders carrying the knives, and a transverse shaft extending through a bore in each of the holders, each of the holders being provided with a slot communicating with the respective

65 bore and the shaft being provided at at least one end thereof with an inwardly stepped portion of smaller diameter than the width of the slot thereby to permit removal of each holder from the shaft by displacement of the holder along the shaft to the  
 70 inwardly stepped portion.

In a preferred embodiment, the longitudinal cutting device has knives which are aligned in the transport direction, rigid with the device and which co-operate with a cutting roller, the  
 75 transverse cutting device being arranged downstream of the longitudinal cutting device. A checking equipment can optionally be arranged upstream of the longitudinal cutting device in order to recognize wrapped articles lying  
 80 incorrectly and to switch the apparatus off before the articles and/or the longitudinal cutting knives are damaged. The holders of the knives of the longitudinal cutting device are each provided with a slotted bore and the knife shaft on at least one  
 85 side has a stepped portion, the diameter of which is smaller than the width of the slot in each knife holder. In this manner, the knife holders can, after release of fixing means, be displaced up to this stepped portion and then simply removed.

90 In the case of optionally present checking equipment, rapid re-equipment may be made possible if the shaft for reception of the checking rods can be exchanged completely, for example by mounting the shaft in entraining means with two bearing spigots.  
 95

An embodiment of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

100 Fig. 1 is a longitudinal sectional view of longitudinal and transverse cutting apparatus according to the said embodiment;

Fig. 2 is a detail view, to an enlarged scale, of a longitudinal cutting device with checking device of the apparatus;

105 Fig. 3 is a cross-section of the longitudinal cutting device; and

Fig. 4 is a cross-section of the checking device.

Referring now to the drawings, there is shown  
 110 longitudinal and transverse cutting apparatus connected to and disposed downstream of a known skin packaging or thermal moulding machine 1. In the case of skin packaging, cardboard with the products to be packaged is laid  
 115 on a table 2 of the machine. A film of plastics material drawn off a roll is clamped in a moulding station of the machine, heated and skin-packaged multiple useful products are then produced in a known manner. These are  
 120 transported as a continuous strip 3 out of the moulding station and subsequently separated from each other.

When the upstream machine is a thermal moulding machine, a deep-drawing mould is mounted on the table 2 and the strip 3 then consists of contiguous deep-drawn parts.

125 The separation takes place in the cutting apparatus by means of a longitudinal cutter 4 and a transverse cutter 5. The transverse cutter 5 is



arranged downstream of the longitudinal cutter 4 and consists of a carriage 6 with a rigid lower knife 7, a vertically movable bridge 8 with an upper knife 9, a drive 10 for reciprocating motion of the bridge 8, and various deflecting rollers 11 to 14. A support belt 15 extends around the rollers 11 to 14 and also around rollers 16 to 19.

The carriage 6 is displaced horizontally through a drive 20, which also drives the roller 19 and a cutting roller 21 of the longitudinal cutter 4. In closed setting, the transverse cutter 5 draws the strip 3 out of the machine 1 which causes the strip to be cut longitudinally by the cutter 4. The carriage 6 of the cutter 5 then travels against the withdrawal direction and executes transverse cuts at predetermined places, in that it runs up on a control device which is adjustable.

The longitudinal cutter 4 is composed of two bearings 22 and 23, the cutting roller 21, a transverse shaft 25 for the reception of knife holders 26 with squeezing knives 27 and a transverse strip 28, on which fixings 29 are displaceably arranged. The gap between the knives 27 and the cutting roller 21 can be set through the pressure screw 24. The fixings 29 prevent unintended lateral displacement of the knife holders 26 in that they encompass the upper part of each holder 26, for example by a fork-shaped portion.

The shaft 25 extends through a bore in each knife holder 26 which communicates with a slot 40 having a width A smaller than the diameter of the shaft 25 in its centre region. The shaft 25 is provided at either or each end thereof with a stepped portion 30, the diameter B of which is smaller than the slot width A. The removal or exchanging of the knife holders 26 is relatively simple, in that after loosening of the screw 31 at the fixing 29, a lateral displacement and thereby removal of the knife holders 26, by movement of the stepped portion 30 through the slot 40, can take place. Conversely, the adding of knife holders 26 is possible just as rapidly.

A checking device 32 is advantageously arranged in front of the knives 27, above all for the division of a strip of skin-packagings. When the knife holders 26 can be exchanged rapidly during re-equipment, this should also apply to the checking device 32. For this reason, the checking device comprises rods 33 each clamped on a shaft 35 by a respective clamping piece 34. The shaft 35 is shape-lockingly coupled to a rotatable spigot 36 and to a spigot 37, the spigot 34 being resiliently mounted and capable of being drawn back by a knob 38. After drawing back of the spigot 37, the shaft 35 can be taken out and exchanged against a new shaft with another division or number. The shafts 35 with mounted rods 33 are thus to be considered as format parts and are simple and cheap to make.

A strap 39 is fastened outside at the spigot 36 and actuates a limit sensor (not shown) when one of the rods 33 is turned due to impinging against an article in the strip 3, which has the consequence of immediate switching-off of the

drive 20.

The axis 44 of the central part of the transverse shaft 24 and the axes 45 of two bearing spigots 41 mounting the shaft can be displaced eccentrically by the amount E. If a strap 42 is fastened to an outer part of one of the bearing spigots 41 and secured against rotation by a displaceable pin 43, then it is possible before the exchange of a knife holder 26 and through turning of the transverse shaft 25 through 180° after removal of the pin 43, to lift the knives by about twice the amount of the eccentricity E. Thereafter, the knife holders 26 can be pivoted in anticlockwise sense, which means that the upper parts of the knife holders 26 are disengaged from the fork-shaped parts of the fixings 29. The pressure screw 24 then no longer bears against the transverse strip 24.

Consequently, it is possible to laterally displace the knife holders 26 without changing the fixings 29. A new setting of the fixings and of the cutting gap is no longer necessary after the insertion of a new knife holder 26.

Since the fixings 29 are narrow, these can in many cases be left at the required setting for several format settings. During a re-equiping operation, the correct fixing is retained and it is merely necessary to insert or reset the knife holders 26.

## 95 CLAIMS

1. Cutting apparatus for longitudinal and transverse cutting of a strip to separate articles joined by the strip material, the apparatus comprising a transverse cutting device and a longitudinal cutting device arranged upstream of the transverse cutting device with respect to a direction of movement of the strip through the apparatus, the longitudinal cutting device comprising a plurality of knives arranged to produce cuts extending in said direction, a plurality of holders carrying the knives, and a transverse shaft extending through a bore in each of the holders, each of the holders being provided with a slot communicating with the respective bore and the shaft being provided at at least one end thereof with an inwardly stepped portion of smaller diameter than the width of the slot thereby to permit removal of each holder from the shaft by displacement of the holder along the shaft to the inwardly stepped portion.

2. Cutting apparatus as claimed in claim 1, comprising an exchangeable checking device for checking the spacing of such articles transversely of the strip, the checking device comprising a shaft and a plurality of rods secured to the shaft and each arranged to, in use, project into the region of a predetermined space between two longitudinally extending rows of articles in the strip, the shaft of the checking device being detachably mounted in the apparatus by displaceable mounting means.

3. Cutting apparatus as claimed in either claim 1 or claim 2, wherein the transverse shaft of the longitudinal cutting device is mounted in bearing means to be rotationally displaceable

about an axis eccentric to the shaft axis, means being provided for rotationally displacing the transverse shaft and for locking the shaft against rotational displacement.

4. Cutting apparatus substantially as  
5 hereinbefore described with reference to the accompanying drawings.

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